Susceptibility to rubella among pregnant women and the serological evidence of congenital rubella in newborn babies at Colombo South Teaching Hospital

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(Index words: Cord blood samples, antenatal blood samples, IgM and IgG rubella specific antibodies).

Abstract

Objective To determine the susceptibility to rubella infection in early pregnancy and the incidence of seropositivity of cord blood for rubella specific IgM among the newborn babies at Colombo South Teaching Hospital.

Methods 1000 cord blood samples and 500 maternal blood samples from pregnant women before the 16th week of gestation were taken from the labour room and the antenatal clinic of the University Unit, Colombo South Teaching Hospital during the period of February 1999 to February 2001. These samples were tested for rubella specific IgM and IgG antibodies by ELISA. A detailed questionnaire was filled during the time of sampling.

Results Of the 500 antenatal blood samples 82% were positive for rubella specific IgG. 373(75%) women gave a history of vaccination against rubella before their present pregnancy. Among the vaccinated 2(0.5%) were negative for IgG antibodies by ELISA. Out of 127 unvaccinated women 12(9%) gave a history of past infection with rubella and of this 3(25%) were seronegative for rubella specific IgG. 18% of pregnant women at 16 weeks of gestation were at risk of giving birth to a baby with congenital rubella syndrome. Among the tested 1000 cord blood samples three were seropositive (0.3%) for rubella specific IgM.

Conclusions A significant proportion of pregnant women were susceptible to rubella infection in the studied population. The present strategy of selective rubella vaccination should be reconsidered if we are to get closer to eliminating rubella syndrome in Sri Lanka.

Introduction

The most serious consequences of rubella results from fetal infection during the first trimester of pregnancy. Up to 90% of infants born to mothers infected during the first 8 to 10 weeks of gestation will show serious anomalies (1). The risk of damage declines to about 10 to 20% by 16 weeks. After this stage of pregnancy, fetal damage is rare. Maternal infection late in pregnancy does not cause clinical manifestations in the neonate (2).

Congenital rubella has been largely controlled by immunisation in the developed world (3). The goal of the rubella vaccination program is to prevent the consequences of infection during pregnancy. Serological surveys in India indicate that up to 45% of women of childbearing age are susceptible to rubella and at risk of infection during pregnancy (4).

In Sri Lanka rubella outbreaks are recorded from time to time and during the epidemic in 1994-1995, 444 cases of congenital rubella syndrome (CRS) were reported (5). Following this outbreak the need for a national rubella immunisation program was addressed and rubella vaccination was introduced to the expanded program of immunisation (EPI) schedule based on a recommendation by the advisory committee on communicable diseases (6).

The objective of this study was to determine the incidence of seropositivity of rubella specific IgM antibodies in the cord blood of newborns and the proportion of pregnant women at risk of giving birth to a congenitally infected baby at the University Obstetrics Unit, Colombo South Teaching Hospital.

Methods

Ethical approval for the study was obtained from the ethical review committee of University of Sri Jayewardenepura.1000 cord blood samples and 500 maternal blood samples were taken from the labour room and the antenatal clinic of the University Unit, Colombo South Teaching Hospital during the period February 1999 to February 2001. Women less than 16 weeks gestation were included in the study. Informed written consent was obtained and a detailed questionnaire was filled at the time or sampling.

Cord blood samples were tested for rubella specific IgM antibodies using the commercial rubella IgM ELISA kit (CARO Diagnostic GmbH, Germany), and maternal blood samples were tested for rubella specific IgG antibodies using the commercial rubella IgG ELISA kit (CARO Diagnostic GmbH, Germany) in the Microbiology Department of the University of Sri Jayewardenepura.

Results

The mean age of the pregnant women was 29 years, 268(54%) were primiparous, and 232(46%) multiparous. Among the tested 500 antenatal blood samples 82% were positive for rubella specific IgG. 373(75%) women gave a

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history of vaccination against rubella before their present pregnancy. Among the vaccinated 2(0.5%) were negative for IgG antibodies by ELISA. Among the 127 unvaccinated mothers 12(2.5%) gave a history of past infection with rubella and of this 3(25%) were seronegative for rubella specific IgG. 18% of pregnant women, at less than 16 weeks of gestation, were at risk of giving birth to a baby with CRS. 30(26%) out of 115 mothers who did not give a history of vaccination against rubella or past exposure to rubella had rubella specific IgG in blood. Table shows the prevalence of IgG antibodies to rubella among pregnant women attending antenatal clinic at Colombo South Teaching Hospital.

Of the 1000 cord blood samples three were sero-positive for rubella specific IgM antibodies (0.3%). Of these three women one gave a history of rubella-like infection during the second month of pregnancy but the other two did not give any history of exposure to rubella. In all three women there was no history of vaccination against rubella.

Table. Prevalence of IgG antibodies to rubella among the pregnant women

	Rubella specific IgG		*Total*
	Positive	*Negative*	
History of vaccination against rubella	371	2	375
History of past exposure to rubella	9	3	12
No history of vaccination or past exposure to rubella	30	85	115
Total	410	90	500

Discussion

The rubella immunity status of an individual is determined by the seropositivity for IgG rubella antibodies. Clinical diagnosis of rubella is unreliable and a history of rubella would not be significant without serological evidence of previous infection. In this study 25% of women who gave a history of exposure to rubella infection were seronegative for antibodies. Absence of the IgG antibodies indicates that they were susceptible to rubella infection.

In the study population 82% pregnant women had antibodies against rubella and were immune to rubella. 18% of pregnant women were seronegative and at risk of developing rubella during their present pregnancy, with the risk of fetal CRS. This is highly significant considering the fact that this population had access to antenatal clinics at a Teaching Hospital. The situation in general in the country could be much worse. The main objective of the introduction of rubella immunisation into EPI in Sri Lanka is to prevent CRS by improving herd immunity (6). Although rubella is found all over the world the incidence varies in different geographical regions. A higher prevalence of rubella immunity (93.2%) has been reported in European women than in African (86.7%) and Asian women (78.4%) (7).

In utero infection is demonstrated by detecting rubella specific IgM antibodies in cord blood. The price paid by the family and society for every child born with CRS would far exceed the cost of expanding immunisation coverage for rubella (8). Our study shows that 18% of women were susceptible to rubella in pregnancy and a 0.3% incidence of intrauterine infection with rubella causing possible CRS. Therefore we cannot be satisfied with the immunity levels achieved by the EPI vaccination program before February 2001. For getting nearer to eliminating CRS, as in developed countries such as Australia and the UK, more effective strategies such as introduction of measles, mumps, rubella (MMR) vaccine into the immunisation schedule for all children at 12 to 15 months and booster to be given at 14 years to increase herd immunity level should be considered (9). Most countries in western Europe have now implemented mass infant rubella immunisation programmes, instead of or in addition to selective vaccination to achieve the elimination of CRS (10). The best defence against fetal infection in the first 16 weeks of pregnancy is a high uptake of MMR in young children (11). A study done in one district of Sri Lanka showed that the combination of immunising girls at 12 years of age for 10 years and all children at 3 years against rubella can significantly reduce the risk of CRS in the short term and the proportion susceptible to rubella in the community in the long term (12).

In the present study the vaccination coverage before pregnancy was 75%. Of this in 3 (1%) seroconversion had not taken place. A break down in the cold chain would result in vaccination failures (13,14). Every effort must be made to identify and immunise seronegative women before they become pregnant by routine screening at antenatal, family planning, subfertility and occupational health clinics. All women found on antenatal screening to be susceptible to rubella should be offered the vaccine after delivery, before the next pregnancy.

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